STATE OF CALIFORNIA
GOODWIN J. KNIGHT, Governor
DEPARTMENT OF NATURAL RESOURCES
DeWITT NELSON, Director

DIVISION OF MINES
Ferry Building, San Francisco 11
OLAF P. JENKINS, Chief

MINERAL INFORMATION SERVICE

Vol. 7 January 1, 1954 No. 1

MINERAL INFORMATION SERVICE is a monthly news release concerning the mineral resources and industry of CALIFORNIA, designed to inform the public of the discoveries, operations, markets, statistics, and new publications. It is distributed without cost upon request.

PETROLEUM IN CALIFORNIA

The date of drilling the first oil well in California is not known exactly. Early activity centered around oil and tar seeps in Los Angeles, Humboldt, Ventura, Santa Barbara, and Kern Counties. The industry grew rapidly, and since 1929 California's oil production has ranked second among the oil producing states of the nation. To the end of 1952 the cumulative production of crude oil in California amounted to well over a billion barrels. Currently the state is producing about one million barrels a day from more than 31,000 wells located in approximately 175 oil and gas fields.

Origin of Petroleum

Important petroleum resources have been found only in certain restricted areas of the state. The reason for this is not accidental, but is related to the origin and accumulation of petroleum and to the geologic history of the state. It is now generally believed that petroleum is formed from marine organisms that were buried in shallow-water sediments in past geologic ages. The processes by which this buried organic matter is turned into petroleum are not completely understood, but such factors as bacterial action, depth of burial, temperature, pressure, and perhaps radio-activity, are contributing causes. The common occurrence of oil-bearing rocks in contact with or above diatomaceous rocks has been considered evidence of the importance of the organic remains of diatoms as a source of much of California oil. It is possible that a wide variety of organic matter has contributed to formation of petroleum.

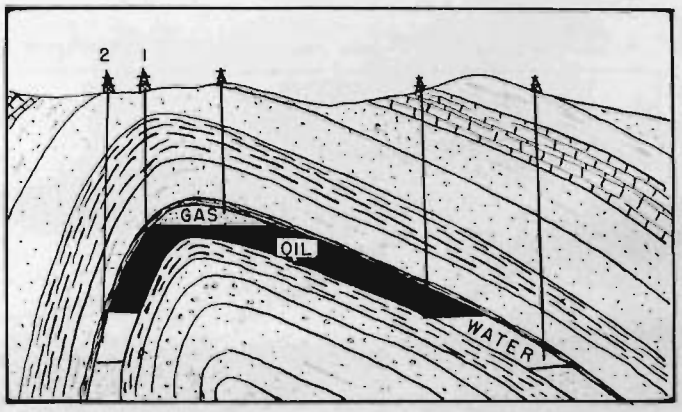
Migration and Accumulation of Petroleum

After formation, petroleum must migrate to and be trapped in a permeable and porous reservoir rock before a potential oil pool can be said to exist. It is generally thought that as the source rock is buried deeper and is compacted petroleum is squeezed out of relatively impermeable shale and forced into more permeable rock such as sandstone. Then by a combination of continuing migration energy, (e.g., capillarity, gas pressure, and hydraulic pressure) the oil and gas are forced into the reservoir rock where ultimately a concentration of oil results if a suitable trap exists. Petroleum does not exist in vast underground lakes, but is found in the pore spaces between sand grains or within fractured rocks. Many "solid" sandstone beds have a porosity of 30 to 40 percent.

Traps

A trap is any combination of geologic features that will stop the upward and lateral migration of petroleum and allow it to collect in a limited area. A trap may be the result of stratigraphic conditions, structural deformation, or a combination of the two. The classical and most widely known type of trap is the closed anticline. This is a dome-like upward flexure of sedimentary beds that provides a pocket for the accumulation of oil and gas. In order to be effective, the trap must lie under a more or less impervious caprock or other seal. Figure 1 illustrates the collection of oil and gas in an ideal anticline.

The migration of petroleum may be also stopped by a fault seal, by the lensing out of the reservoir rock, by changes in permeability, by an unconformity, by a salt dome or volcanic plug, or by a combination of several of the above features. Figure 2 is an idealized sketch showing three distinct methods of accumulation common in California oil fields.



Simple asymmetrical anticlinal trap. Well number 1 is productive; number 2, is barren.